ORIGINAL

AUTOMATIC FAUCET AND WATER DISCHARING DEVICE

08 JUN 2012
5095 DELWP 12

Abstract of the Invention

An object of the present invention is to provide an automatic faucet that is easy for a user to use, of which a sensor window can be easily cleaned, and of which a sensor is suppressed from falsely detecting water stream ejected from a water spout member.

Provided is an automatic faucet, which has a water spout member 60 and a sensor 66 placed in a front end section of a water spout pipe 12 and automatically ejects water from the spout member 60 by the detection by the sensor 66. The water spout pipe 12 has a shape, in which a section of the front end side is directed forward and obliquely downward with respect to a user. The water spout member 60 and the sensor 66 are axially inserted into the water spout pipe 12 from the obliquely downward opening 16 of the tip of the water spout pipe 12, and the sensor 66 is disposed above the water spout member 60. The water spout member 60 is disposed in a state where the front end face thereof is positioned to the inside of the water spout pipe 12 than the front end face of the sensor 66.

We Claim:

[Claim 1]

An automatic faucet, which is provided with a water spout member and a sensor in a front end section that is a tip section of a water spout pipe, and which discharges water from the water spout member due to a detection of a detection target using a sensor,

wherein the water spout pipe has a shape, in which a portion of the front end side is directed forward and obliquely downward with respect to a user and an opening, which has an opening face intersecting with a pipe axis and forms a face facing obliquely downward, is formed on the front end face of the water spout pipe, and

wherein the water spout member and the sensor are inserted from the opening into the water spout pipe in a pipe axial direction, and the sensor is installed above the water spout member in a state where the front end face of the water spout member is positioned on the back-side of the water spout pipe than the front end face of the sensor.

[Claim 2]

The automatic faucet according to claim 1,

wherein the water spout member is placed in the water spout pipe so that the front end face of the water spout member is positioned on the back-side than the front end face of the water spout pipe.

[Claim 3]

An automatic faucet, which is provided with a light emitting section and a light receiving section of an optical sensor, and a water spout member in a front end section that is a tip section of a water spout pipe, and which automatically discharges water from a water spout due to a detection of a detection target using an optical sensor,

wherein the water spout pipe has a shape, in which a portion of the front end side is directed forward and obliquely downward with respect to a user and an

opening, which has an opening face intersecting with a pipe axis and forms a face facing obliquely downward, is formed on the front end face of the water spout pipe, and

wherein the light emitting section, the light receiving section and the water spout member are inserted from the opening into the inner section of the front end section of the water spout pipe in a pipe axial direction in a state of being held by the holding member, each of the light emitting section, the light receiving section and the water spout member is extended to forward and obliquely downward, the light emitting section and the light receiving section are positioned above the water spout member, and the water spout of the front end of the water spout member is mounted in a state of being positioned in back-side of the water spout pipe than the light emitting window of the light emitting section side and the light receiving window of the light receiving section side, and

wherein a lower section leading to the light emitting window of the front face of the holding member is a face having a shape, which shifts to the back-side of the water spout pipe, as separating from the light emitting window toward the water spout side.

[Claim 4]

The automatic faucet according to claim 3,

wherein a lower section leading to the light receiving window of the front face of the holding member has a face having a shape which shifts to the back-side of the water spout pipe as separating from the light receiving window toward the water spout side and.

[Claim 5]

The automatic faucet according to claim 3 or 4,

wherein the light emitting window and the light receiving window are positioned to be projected forward from the front face of the holding member.

[Claim 6]

The automatic faucet according to any one of claims 3 to 5,

wherein the light emitting section is configured by a tip section of the optical fiber on the light emitting side, and the light receiving section is configured by a tip section of the optical fiber on the light receiving side.

[Claim 7]

An automatic faucet, which is provided with a sensor which has a light emitting section and a light receiving section, and which automatically discharges water from a water spout based on a detection of a detection target using the sensor,

wherein a light emitting window for emitting light from the light emitting section toward the detection target and a light receiving window for receiving a reflected light from the detection target by the light receiving section are independently provided on the front face of an installation section of the light emitting section and the light receiving section to be separated from each other, and

wherein a portion of the front face of the installation section between the light emitting window and the light receiving window is a concave section having a recessed shape to the back-side as an opposite direction of a detection direction using the sensor than a flat standard face.

[Claim 8]

The automatic faucet according to claim 7,

wherein the light emitting window and the light receiving window are provided to be projected to a front side of the detection direction from a standard face in the front face of the installation section.

[Claim 9]

The automatic faucet according to claim 7 or 8,

wherein a cylindrical spout member forming the water spout is mounted to an inside of a tip section of the water spout pipe, the light emitting section and the light receiving section are installed in the water spout member, the light emitting window and the light receiving window are provided on the front face of the water spout member as the front face of the installation section, and

wherein the section of the front face of the installation section between the

light emitting window and the light receiving window is the concave section.

[Claim 10]

The automatic faucet according to claim 9,

wherein the water spout pipe has a shape, in which a section of the front end side close to a user is directed forward and obliquely downward with respect to a user, the water spout member is inserted from the opening of the tip of the water spout pipe into the water spout pipe in a state of setting the front face forming the front face of the installation section to face obliquely downward, and in a state of positioning the front face to the back-side than a front end and a upper section of the water spout pipe, and

wherein in a position adjacent to the end of the water spout pipe and the upper section, the light emitting window and the light receiving window are placed on the upper section of the front face of the water spout member.

[Claim 11]

The automatic faucet according to claim 9 or 10,

wherein a water stream passing member, which is positioned in the tip of the water path to pass the water stream and controls a form of the discharged water, is held inside the water spout member forming a cylindrical shape, and

wherein the water stream passing member sucks the air from an air suction hole, involves the air in the passing water flow and discharges the air as a foam flow of a mixed air bubble from the water spout, and

wherein the concave section communicates with the air suction hole.

[Claim 12]

A water discharging device comprising:

(a) a water spout pipe;

(b) a cylindrical water spout member, which is mounted to an inside of a tip section of the water spout pipe and forms a water spout of a tip of a water path in the water spout pipe; and

(c) a discharging end member, which is placed in the water spout to pass a

water stream and controls a water discharging pattern from the water spout,

wherein the discharging end member is inserted into the device by using the cylindrical water spout member as a housing, and each of the discharging end member and the water spout member is fixed to the water spout pipe by a common fixing member.

[Claim 13]

The water discharging device according to claim 12,

wherein a fitting shaft section is provided in the fixing member, a fixing hole passing through a pipe wall is provided in the water spout pipe and a fitting hole fitting the fitting shaft section is provided in the discharging end member and the water spout member in a state of overlapping each other in a direction of passing through the fixing hole and penetrating through the pipe wall of the water spout pipe, and

wherein the fitting shaft section of the fixing member is fitted from the outside of the water spout pipe through the fixing hole to the fitting holes of the water spout member and the discharging end member, respectively, and the discharging end member and the water spout member are fixed to the water spout pipe.

[Claim 14]

The water discharging device according to claim 13,

wherein the fixing hole has a hole diameter greater than the fitting holes of the discharging end member and the water spout member, and the fixing member is provided with a circumferential wall section of an outer diameter corresponding thereto, and

wherein the fixing member is attached to the water spout pipe in a state of fitting the circumferential wall section to the fixing holes.

[Claim 15]

The water discharging device according to claim 14,

wherein, in a position facing each other in the radial direction of the circumferential wall section, claw sections caught to an edge section of the fixing

hole is provided in a shape projecting in the radial direction,

wherein one claw section is fixed to the circumferential wall section, the other claw section is provided in the tip of an elastic piece, and then an elastic claw is configured by the elastic piece and the claw section of the tip, and

wherein a claw section of the elastic claw is caught to the end section due to an elastic deformation of the elastic piece by the pushing of the water spout pipe.

[Claim 16]

The water discharging device according to claim 15,

wherein the fixing member is attached in a state where the pair of claw sections is positioned in a left-right direction when viewed from a front with respect to the water spout pipe.

[Claim 17]

The water discharging device according to any one of claims 12 to 16,

wherein the water spout member has a cylindrical insertion section, and the insertion section is inserted into a flexible water supply tube arranged in the water spout pipe and is connected to the water supply tube.

[Claim 18]

An automatic faucet, which is provided with a sensor that projects light from a light projection section provided in a water spout pipe and receives a reflected light from a detection target by a light receiving section provided in the water spout pipe to detect a detection target, and which automatically discharges water based on the detection of the detection target using the sensor,

wherein an optical fiber or a cord of an electric wire configuring a part of the sensor is extended into the water spout pipe through an opening of a base end side of the water spout pipe,

wherein, in the cord, an engagement convex section projecting from an outer face of the cord to the outside in a radial direction is provided in a fixed state, a receiving section, which brings the cord into contact with the engagement convex section through the opening in a direction of being detached from the water spout pipe,

is provided in the water spout pipe, and then an anti pull-out mechanism is configured to receive tension of the detaching direction applied to the cord by the engagement convex section and the receiving section and stops the cord, and

wherein the anti pull-out mechanism restricts the movement of the cord in the extraction direction, and allows the movement of the cord to separate the engagement convex section from the receiving section in an opposite direction.

[Claim 19]

The automatic faucet according to claim 18,

wherein an anti pull-out member separately formed from the water spout pipe is attached to an inner face of the water spout pipe, and the receiving section is formed of the anti pull-out member.

[Claim 20]

The automatic faucet according to claim 19,

wherein a water supply tube guiding the supplied water to the water spout is provided in the water spout pipe,

wherein a cord insertion port inserting the cord is provided in the receiving section of the anti pull-out member, and a tube insertion port inserting the water supply tube is provided in the anti pull-out member, and

wherein the anti pull-out member positions the cord and the water supply tube in the radial direction by the cord insertion port and the tube insertion port.

[Claim 21]

The automatic faucet according to claim 20,

wherein the cord insertion port and the tube insertion port are provided to be adjacent to each other, and the cord insertion port is configured so that a part of the side of the tube insertion port is partially formed as an opening section, and the cord insertion port and the tube insertion port are continued in the opening section.

[Claim 22]

The automatic faucet according to any one of claims 19 to 21,

wherein the anti pull-out member has a ring shape having elastic deformability in the radial direction,

wherein the anti pull-out member is to be pushed into the water spout pipe in a diameter-reduced state and is attached to the inner face of the water spout pipe in a diameter-expanded state after the pushing.

[Claim 23]

The automatic faucet according to any one of claims 19 to 22,

wherein the anti pull-out member is housed in the inner section of the water spout pipe in a state of not being exposed to the outer section of the water spout pipe.

Dated this the 8th Day of June, 2012

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